

Designing an interactive online study skills course: A systemic design-based approach

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Abstract: Developing interactive eLearning courses is perhaps one of the most challenging tasks for instructional designers and developers. Nonetheless, the rich literature on instructional systems design provides a plethora of theoretically sound approaches and models for designing interactive online courses. Due to the complexity and diversity of eLearning environments, instructional designers need to document their design processes and share their experiences so that new theoretical knowledge and applications continue to be generated. This study used a design-based approach to document the cyclical and reiterative process of designing and developing the study skills course. The study applied the ADDIE instructional design model as a sub-system model to design, develop, deliver, and evaluate the online study skills course. The qualitative data were collected using document analyses, focus groups, and structured interviews with policymakers, SMEs, and instructors at SQU to define the gap in the practices of the design and development of SPOCs. In addition, a need assessment survey was used to collect quantitative data from the Instructional and Learning Technology (ILT) department at Sultan Qaboos University (SQU). The researchers used the instruments associated with each phase of the ADDIE model during the design and development of the intervention (the Study Skills course). The SMEs, instructional designers, developers, and e-learning specialists used a continuous feedback loop and formative evaluation to review each phase. The course evaluation sheet and the overall course grade indicated that the students had a positive online course experience. In addition, new contextual factors were identified and added to the design principles checklist that can be adapted and adopted in other learning environments.

Keywords: Online courses, ADDIE model, Design-based approach, Study skills, Instructional design

I. INTRODUCTION

Online learning has become crucial to all education systems in various countries, particularly in developing countries, as a potential to meet the growing demand, especially within the Covid-19 pandemic circumstance (Osman, 2020). This phenomenon can be considered a tool to increase the number of students accessing higher education because it is a less expensive and more flexible alternative, especially for students from marginalized groups or rural areas (Naresh & Reddy, 2015). Well-designed online courses can provide a variety of conducive features to learning. However, the quality of the material in online courses and the best practices of the quality assurance regulations are essential for successful online courses (Kulshrestha & Sharma, 2017). Khan (2005) argued that identifying critical issues could

enhance the quality and efficacy of online learning characteristics within the different categories of open, flexible, and distributed learning environments. Ally (2011) further emphasized that appropriate learning principles must also be adapted to encourage quality and achieve the learning outcomes as well as consistency between students' specific requirements and teaching practices.

Many learning theories have been developed recently due to the changes in students' and instructors' needs and roles (Axmann & Greyling, 2003). Al-Kindi et al. (2017) pointed out that shifting courses to online mode should encompass all pedagogical learning theories in their design, including constructivism, behaviorism, informal learning, blended learning, collaborative learning, and self-study. Most online courses are designed to build students' cognitive skills. Thinking skills are part of the cognitive skills in which interactive e-learning activities are required as these skills are better acquired 'by doing'. Interaction can be achieved through role-playing and meaningful feedback, which consequently can change the behaviors and attitudes of learners (McCombs & Vakili, 2005).

Instructional design (ID) strives to replace the conventional teacher-centered approach with a learner-centered one to ensure effective learning. This indicates that elements of instruction are regulated by the learning objectives developed through careful examination of the learners' needs (McGriff, 2000). Reigeluth (2013) claimed that instructional design affects the quality of online instruction and learning. According to Gustafson and Branch (2002), instructional design is a complex system of integrated elements and procedures to develop instructional and training programs consistently and reliably. Research has shown that The instructional design process is structured by ID models that outline how instructional design should be conducted, what methods and techniques are effective in various situations, and how instructional designers should consistently enhance their expertise (Dick et al., 2005; Ross et al., 2010; Seels & Glasgow, 1998; Smith & Ragan, 2005). Due to contextually different learning environments, diverse ID models have been produced (e.g., ADDIE, ASSURE, DC, MRK, Kemp, Dick and Carry, and Seels and Glasgow). Accordingly, a taxonomy of ID models was created to show whether an ID model was best utilized for the implementation of classroom-level training (classroom-oriented), products with minimal instructional assistance (product-oriented), or

large and complicated educational solutions (systems-oriented). Gustafson and Branch (2002) noted that the taxonomy was developed to help instructional designers and instructors to select the appropriate ID model for each project by reviewing common features and attributes of instructional design models. Accordingly, the instructional designers and teachers could choose the scope of the course materials, the sequence of lessons, creative presenting techniques, and evaluation methods. Table 2 illustrates a comparison of common features for each category. This taxonomy classifies ID models into three categories: classroom-oriented, product-oriented, and systems-oriented models (Gustafson & Branch, 2002; Reigeluth, 2013; Twilley, 2014).

Table 1. ID model classification

	Classroom Models	Product Models	System Models
Approach	Holistic	Systematic	Systemic, Systematic
Typical Output	Hours of Instruction	Instructional Package	Course, Curriculum
Goal	Improve content	Create New Content	Create New Content
Resources	Very Low	High	High
Level of Effort	Individual	Team	Team
ID Skills	Low	High	Very high
Content Origins	Revise Existing	Develop New	Develop new
Analysis	Low	Low to Medium	Very High
Technology	Low	Medium to High	Medium to High
Revision Cycles	Medium	High	Medium to High
Implementation	Low	High	Medium to High
Instructional Design Models	<ul style="list-style-type: none"> ▪ Morrison, Ross & Kemp Model ▪ ASSURE ▪ Gerlach-Ely Model 	<ul style="list-style-type: none"> ▪ Leshin, Pollock & Reigeluth Model ▪ Bergman & Moore ▪ Seels & Glasgow 	<ul style="list-style-type: none"> ▪ Dick & Carey Model ▪ ADDIE Model ▪ Smith & Ragan Model

Note. From “An Examination of the Practice of Instructional Design and the Use of Instructional Design Models” by J. Twilley, 2014, University of Central Florida, p. 27. (<https://stars.library.ucf.edu/etd/4622>).

Although the detailed steps and processes vary from one ID model to another, they share the primary phases of the generic instructional model that underlie the instructional design process: Analysis, Design, Development, Implementation, and Evaluation (ADDIE). The stages of the ADDIE model are implemented in this study to design and develop an online study skills course as a university elective course.

The literature presented below has identified some challenges concerning online learning and course design. Some of these challenges are related to institutional regulations, policies, online learning systems, platforms, content, context, and ethics. Several researchers have studied these challenges generally, and some were more specific in addressing challenges related to the Omani context, which are emphasized in this study.

In a study by Kulshrestha and Sharma (2017), the participants clarified some challenges related to e-learning. The major challenge was that some participants (55.6%) reported that courses did not fit into their schedules. As a result, they were not allowed to receive any certifications. The second major challenge was the associated high fees (38.9%), followed by long assignments (33.3%). The researchers pointed out that only 1,388 received a certificate out of the 150,349 students who were enrolled in a course on edX. Similarly, 154,763 people signed up for the Circuits and Electronics course, but only 7,157 received their completion certificate. Additionally,

about (9%) of the participants were challenged by the lack of required technology.

Abdelraheem (2006) discussed a number of challenges related to the Omani context. He mentioned infrastructure, leadership, culture, local content, and e-learning strategies challenges. He argued that contextual e-learning strategies bridge the gap between technology and learning effectiveness. According to Abdelraheem (2006), there is a need for proper web-hosting services and skillful people in digitizing and coding pages to develop and deliver the best quality materials. Similarly, Behl et al. (2007) investigated e-learning challenges in the UAE and Oman and reported barriers related to content suitability and instructional, technological, and organizational barriers. Mungania (2003) also added some personal or dispositional challenges. A comprehensive review of literature by Grönlund and Andersson (2009) revealed different types of challenges that can be classified into four broad categories: (1) course challenges, content, design, and delivery; (2) challenges related to students and teachers’ characteristics; (3) technological challenges; and (4) contextual challenges. Table 2 below summarizes these challenges. Grönlund and Andersson (2009) argued that although all listed challenges are essential, contextual challenges have more significant implications on the development and adoption of eLearning. Their review findings appear to be in congruence with the purpose, which emphasizes the importance of generating new contextual design principles.

Table 2. Framework on challenges for e-learning.

Individual challenges	Student <ul style="list-style-type: none"> • Motivation • Conflicting priorities, Finance • Academic confidence • Technological confidence • Social support (support from home and employers), Gender and age Teacher <ul style="list-style-type: none"> • Technological confidence • Motivation and commitment • Qualification and competence and Time
Course challenges	Course design <ul style="list-style-type: none"> • Curriculum • Pedagogical model, Subject content • Teaching and learning activities • Localization, Flexibility Support provided <ul style="list-style-type: none"> • Support for students from faculty • Support for faculty
Contextual challenges	Organizational <ul style="list-style-type: none"> • Knowledge management • Economy and funding • Training of teachers and staff Societal/Cultural <ul style="list-style-type: none"> • Role of teacher and student • Attitudes to e-learning and IT • Rules and regulations
Technological challenges	<ul style="list-style-type: none"> • Access, Cost • Software and interface design • Localization

Source: (Grönlund and A. Andersson, 2014, p.9).

The “Study skills course” that has been designed and developed in this study is a fully online course offered by

Sultan Qaboos University as a university elective course. It started in 2005 as a blended course with 70% face-to-face and 30% online self-based learning. Al Musawi (2010) pointed out that SQU implemented online courses on-campus, which are recognized as SPOCs. The implementation of e-learning started at SQU in 2001 with a limited number of blended courses on WebCT, which was the first LMS used by SQU. According to Osman (2020), SQU has witnessed rapid adoption of online courses within a short period.

Nonetheless, this rapid increase in online learning has been limited to a blended format where most of the interactive features of the e-platforms were not fully utilized. Most blended online courses lack clear and proper contextual frameworks for designing and developing online courses (Al-Musawi, 2010). Such frameworks are important for setting and following specific standards and principles of online course design specifically for SPOCs (Lu, 2018). Therefore, a need arises to design and develop the course based on the best design framework which suits SQU students. For example, the university elective Study Skills online course was merely content-based with minimal design attributes such as interactivity, immersion, or engagement. However, study skills online course design and development must follow a systematic process involving elements, inputs, and theories to achieve the effectiveness of an authentic online course with an impact on the performance of on-campus students.

This study intends to systematically and systemically document the process of designing and developing online study skills. Using a design-based approach, the researchers applied the ADDIE instructional design model as a sub-system model for designing, developing, and delivering the study skills online course. The model comprises five phases: Analysis, Design, Development, Implementation, and Evaluation. The model is described as a generic model that can be contextually adapted to various instructional systems (McGriff (2002). Many researchers and practitioners have adopted the ADDIE model to design and develop learner-centered instructional materials for different specializations (Brook, 2014; Croxton & Chow, 2015; Margit, 2018; Muruganatham, 2015; Peterson, 2003; Sahrir et al., 2012; Sahrir & Alias, 2012). For this reason, the researchers tend to use this instructional design model to design and develop the study skills course.

Figure 1 illustrates this study's systematic and systemic processes based on the ADDIE Model.

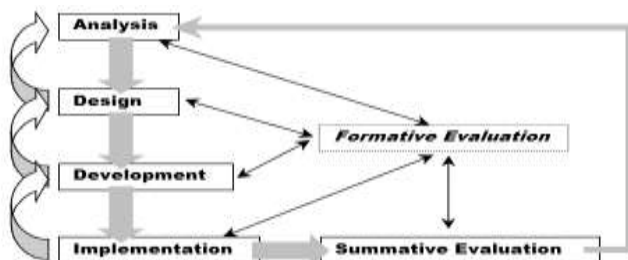


Figure 1: ADDIE Model Process (McGriff, 2000).

II. METHODOLOGY

The research methodology of this study is based on a design-based approach where processes and procedures in each phase of the model are described and documented (McKenney & Reeves, 2018). Accordingly, the data were collected from multi-sources in an iterative cycle of feedback and reflections. The redesign of the existing course was based on a pedagogical and theoretical framework consisting of learning theories, instructional design, and evaluation models. Different learning theories inspired the redesign of the online course. These theories included constructivism, cognitivism, and behaviorism. The researchers followed them to write the course goals and objectives and design the course blueprint. The ADDIE model was used as the course's primary system design model. Nonetheless, other instructional systems design models were consulted as well. These include the Dick and Carry Model for unit design and development and Kirkpatrick's Model of Learning Evaluation to guide the evaluation process of the redesigned course.

2.1. Sample and Data Collection

Different instruments were utilized in this study. The qualitative data were collected using structured interviews with senior management at both the college and university levels, focus groups from instructional designers, instructors from the department of instructional and learning technologies, and other e-learning experts involved in the design and development of SPOCs. On the other hand, the quantitative data were collected using a needs assessment survey and formative and summative course forms (see Figure 1). For example, in the Analysis phase, a needs assessment survey was distributed to a sample of instructional designers and e-learning experts from the Center of Educational Technology and the ILT department to assess and analyze the needs for redesigning the existing Study skills course. As a result, the design Blueprint for the new course was produced. In the development phase of the ADDIE model, and based on the course design blueprint, the researchers worked with instructional designers and Subject Matter Experts (SMEs) to develop the course content, the interactive online activities, and the assessment tools.

Similarly, the formative assessment data were collected from various sources, including instructional designers, SMEs, and students at both a one-to-one and small group levels. Moreover, students' achievement results in both the mid-term test and the final exam were used as a summative evaluation of the effectiveness of the online course. All research instruments were checked for clarity and content validity and were revised accordingly.

2.2. Data Analysis

The design-based research approach requires systemic and cyclical data collection from multiple sources and, thus, consequently requires different types of data analysis, including both descriptive and inferential statistics.

III. RESULT AND DISCUSSIONS

For the purpose of this study, the researchers followed a design-based approach where a systemic and systematic review and documentation of the design and development processes is presented in light of a continuous loop of feedback from various sources, including instructional designers, e-learning experts, instructors, and students. The following is a brief description and analysis of each step of the ADDIE process for redesigning the online course.

3.1. Analysis Phase

The analysis phase in any ID model provides theoretical and practical justification for any learning and instructional initiative. It includes analyses such as learners' needs, performance, context, and training needs. McCombs and Vakili (2005) argued that out of all the important processes in the analysis phase, the learner's needs analysis appears to be the most critical element of course design. It provides important data on students' needs, characteristics, and individual differences, which provides the basis for the design development, implementation, and evaluation phases. Accordingly, the researchers conducted a thorough analysis to establish a need for redesigning the existing course, identify the contextual requirements for developing an interactive online course, and at the same time identify the challenges that both students and faculty may face during the course implementation. Figures 2, 3, and 4 below highlight the main findings of the analysis phase. Figure 2, for example, shows the findings of the needs analysis survey.

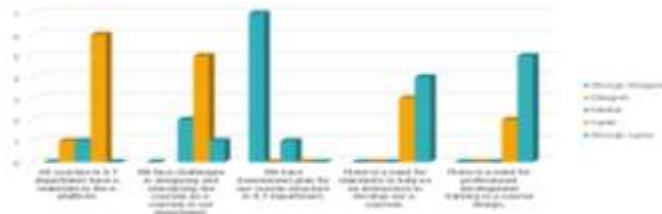


Figure 2. Needs analysis of the survey findings

The researchers then surveyed the faculty members in the ILT department to investigate the current status of the online courses in the department by exploring the availability of rubrics or standards that form the design, development, and delivery of online courses. The survey questions focused on whether faculty members followed a rubric or a checklist to design and evaluate their online courses. Figure 3 shows the real gap in standards for SPOCs. The survey's findings indicated a real gap in standards for designing, developing, and evaluating online courses.

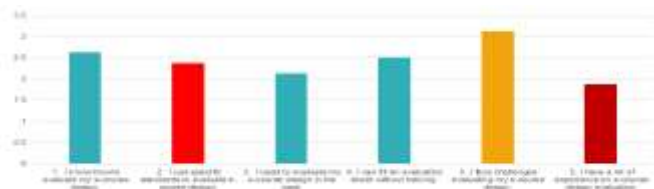


Figure 3. The real gap in standards for SPOCs

This phase also considered the challenges of online course design as part of the survey. The findings show five major challenges: the lack of design standards, technical support, understanding of the features and uses of the LMS tools (Moodle), course structure, and professional development.

3.1.1. Target Audience Analysis

The instructional aims and objectives were established, and the learning environment and learners' pre-existing knowledge and skills were determined. After defining the gap, the researchers decided to choose an elective course from the ILT department: The Study Skills course. This course existed as a blended course in 2007, and students' first enrollment in this course was in Fall 2018. They were from different colleges at SQU and took this course as a university elective. They were male and female learners aged between 18 and 25. Figure 4 presents the number of enrolled students in the Study Skills course in Fall 2018.

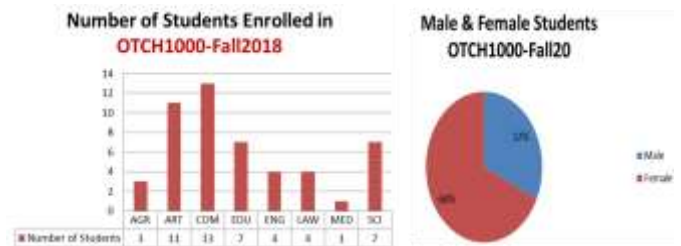


Figure 4. Number of students enrolled in Study Skills course (Fall 2018)

This phase revealed the need for principles that form the design and development of online courses at SQU. The findings of the analysis phase led to both the design and the development phases.

3.2. Design Phase

The main elements of any course are objectives, content, and assessment. The objectives have to be determined first, then the content and assessment are designed to align with the intended outcomes. Objectives guide the designers in deciding on the content and assessment methods (CommLab India, 2016). In this study, the online course has set objectives with reference to behaviorism, constructivism, and cognitivism theories. Furthermore, the course structure implements synchronous, asynchronous, and cohort e-learning to apply interaction where appropriate. The developed online course aligns the three main components (objectives, content, and assessment) to ensure the achievement of the online course outcomes (Elkins & Pinder, 2015).

The design phase included different components such as learning objectives, assessment instruments, exercises, content, subject matter analysis, lesson planning, and media selection. These components formed the main output of this phase: the blueprint or design document. The SMEs reviewed the restructured goal of the course and measurable objectives as well as the task analysis, which consisted of the content, activities, and assessment for achieving the desired objectives of the course. The researchers worked with two instructional

designers to construct the newly developed Study Skills course scenario and focused on the course structure. Based on the individualized instruction theories and the proposed checklist from phase two, the proposed structure included six units, each with its own theme. Each unit consisted of one to three lessons depending on the content.

Two general approaches to online courses are self-paced and facilitated/instructor-led (Mason, 1998). Self-paced learners are alone and entirely independent, while facilitated and instructor-led e-learning courses offer various levels of assistance and guidance, from tutors to instructors and collaboration among learners. In self-paced online courses, learners can explore and study the course materials whenever they like. This necessitates that students access a collection of engaging and comprehensive materials.

Facilitated or instructor-led online learning occurs at a specific time and usually incorporates self-study with collaborative activities such as discussions or group projects (Anderson, 2008). They employ communication techniques and tools that let learners communicate with facilitators and other participants. These tools can be asynchronous, such as e-mail or discussion groups, and synchronous, such as chat and audio conferences. Both facilitated and self-paced online learning activities and content should adhere to quality standards to ensure the learning program's efficiency and success (Anderson, 2008; Johnson & Aragon, 2003).

A blended or fully online course is another approach. A variety of methods can be used in the blended approach to merge e-learning sessions with conventional face-to-face activities. According to research, students who take online courses complete their coursework in around half the time it takes those who attend traditional classes to complete it. Additionally, data shows that students are more motivated, engaged, and active when they work on challenging and demanding materials that are yet within their capacity (Osman & Abdulraheem, 2003). On the other hand, Anderson (2008) noted that fully online courses involve students and instructors using a learning management system as the main tool for content delivery, communication, collaboration, assessment, and evaluation. No face-to-face interaction occurs in fully online courses.

The self-paced approach is implemented in the fully online course developed in this study. The different learning theories apply different principles to ensure that students' individual needs have been met. At the course level, the newly developed course consisted of a fully online self-paced course designed into two forms of structure: branched instruction and programmed instruction. In the self-paced branched instruction, students could access units anytime in any order. However, in the self-paced programmed instruction, students were forced to complete the lessons and accomplish the activities of each unit lesson in sequence, as illustrated in Figure 5.

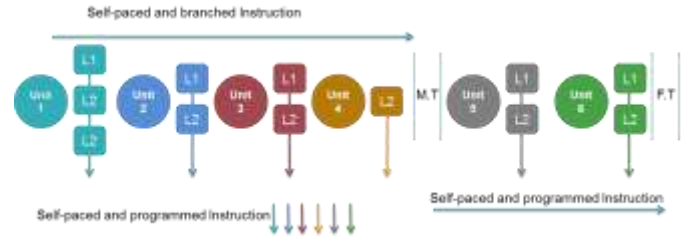


Figure 5. The new developed Study Skills online course structure

Students followed self-paced and branched instruction in the first four units before taking the mid-term exam. Then, they followed the self-paced programmed instruction in the last two units before taking the final exam. The researchers designed two forms for this course to measure the effectiveness of each form and the students' preferences depending on their individual differences.

Northern Illinois University (2008) described the nine events of instruction proposed by Gagné, Briggs, and Wager in 1992, which are systematic key elements that share behaviorism in the design of any online course, focusing mainly on behaviors as outcomes. Each event combines a sample of methods that supports the integration of the events in teaching. These activities and events include drawing students' attention, outlining learning objectives, encouraging students to retrieve prior knowledge, delivering the material, offering learning assistance, retention enhancement, evaluation, feedback delivery, and transfer to the working environments.

The developed online course within this study implements the nine events as a guide to structure the course lessons. In the online course, each lesson considers the nine events comprising the steps of the lesson (Northern Illinois University, 2008). A learner-centered approach encompasses all the above theories based on learners' cognitive and metacognitive factors, motivation, interaction, and individual differences (McCombs & Vakili, 2005).

At the lesson level, based on the nine events of instruction and the proposed checklist from phase two, the structure of the lesson was designed to consist of six steps. The first step was the preface, which aimed to gain the students' attention in the class. The objectives were stated to the students, followed by an introduction to stimulate a recall of their prior knowledge. Then, the content was presented to the students using different formats such as text, audio, video, and various activities. Supplementary and enrichment materials were provided for students to enhance their engagement in the course. Each lesson had a quiz, considered a condition to start the next class. Students could not move to the next class unless they completed the quiz with a grade of not less than 75%. The quiz measured whether students achieved the lesson objectives or not. Students received immediate feedback about the quiz grade that enabled them to move to the next lesson. Once all lessons were completed, students automatically obtained access to the unit test, which is considered a summative evaluation for the unit. While the lesson quiz was used as a condition for the following lesson, the unit test grade

was considered part of the students' overall grades on the course. Figure 6 shows the structure of each lesson in the developed Study Skills online course.

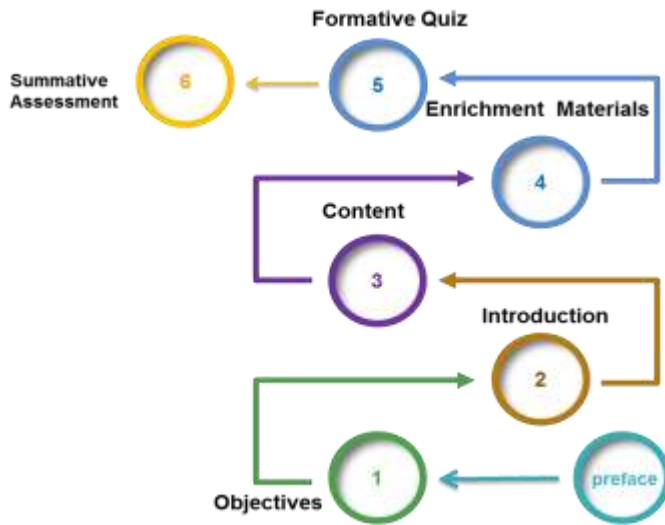


Figure 6. The structure of each lesson in the developed Study Skills online course

3.2.1. Design Document (blueprint)

Based on the approved content outline from the SMEs, a design document was created which outlines all the instructional strategies at the module/chapter/topic levels. The researchers discussed any identified content gaps with the SMEs to finalize the instructional and visual strategy that the course followed. The design document included the main information about the course: the course development process, course context, learner analysis, goals and performance objectives, technologies, course structure, units and lesson materials, and assessment and evaluation strategies. The design document is considered the most crucial output of the design phase in the ADDIE model.

3.3. Development Phase

In the development phase, the content elements intended in the blueprint's design phase were produced and put together by the researchers in collaboration with two instructional developers. The programmers also developed and integrated technologies into the content, activities, and assessment. All developmental processes in the online course were reviewed and revised constantly, depending on any feedback provided by the SMEs and e-learning experts. The instructional developers utilized predetermined expectations from the design phase to develop the course materials, activities, and assessment strategies aligned with the course performance objectives. Figures 7, 8, and 9 illustrate samples of the newly developed online course structure, content, assessments, and other materials.

The newly developed course followed a systematic assessment method, including student interaction through forum discussions, authentic activities such as reports and research proposals, lesson quizzes at the end of each lesson,

unit tests at the end of each unit, and mid and final exams. The assessment tools were designed based on electronic grading, synchronized and synchronized feedback, and well-defined rubrics for each task (see Figures 7, 8, and 9).

اسم المستخدم	الدرجة	التاريخ
محمد بن عبد الله	11/100	2022-09-01
أحمد بن محمد	12/100	2022-09-01
فاطمة بنت أحمد	13/100	2022-09-01
عبد الرحمن بن علي	14/100	2022-09-01
سارة بنت خالد	15/100	2022-09-01
عبد العزيز بن سعود	16/100	2022-09-01
مريم بنت يوسف	17/100	2022-09-01
علي بن محمد	18/100	2022-09-01
نورة بنت عبد الرحمن	19/100	2022-09-01
خالد بن أحمد	20/100	2022-09-01

Figure 7. Online assessment tracing system

Attendance was one of the crucial issues that the researchers considered in this phase. Student attendance depended on completing weekly activities, including studying the content, watching the instructional videos, completing the lesson activities, and submitting the quiz. Students could not access the quiz unless they reviewed the lesson's content, as demonstrated in Figure 9.



Figure 8. The lesson content structure of the Study Skills online course

3.4. Implementation Phase

In the implementation phase, the researchers reviewed the newly developed online course by interviewing individual students in one-to-one interviews, small groups of students, SMEs, and e-learning experts. The actual implementation field test of the newly developed online course occurred in the Fall of 2018, with 50 students enrolled.

3.5. Evaluation Phase

In the evaluation phase, the researchers targeted students' performance and the course design and development. This was achieved by applying both formative and summative evaluation in parallel.

3.5.1. Formative Evaluation

Regarding formative evaluation, the researchers tested the newly developed course with one student (one-to-one) and then interviewed a small group of 10 students. The feedback revealed three crucial issues: the grading book did not show the scores of the students, the absenteeism issue did not show the actual time spent by the students on the online course, and the presence of bugs in some videos and links.

3.5.2. Summative Evaluation

Regarding summative evaluation, the researchers followed the Donald Kirkpatrick Model, which has four levels: reaction, learning, behavior, and return on investment (Chang & Chen, 2014). At the reaction level, the researchers used the design principles checklist from phase two to design a course evaluation sheet and measure the students' reaction toward the design, development, and delivery of the newly developed course. This proposed evaluation course was reviewed by e-learning experts and instructional designers and then refined accordingly. Finally, it was used as an evaluation tool at the end of the semester. The course evaluation sheet had three categories: ID standards, communication and interaction, and assessment and evaluation. Significant feedback was collected from the students, highlighting these three categories. The course objectives were met thoroughly, and the students highly preferred the programmed instruction. E-tests were appreciated by most of the students as an assessment tool. Synchronous and asynchronous forum discussions were the interactive tool that most helped to engage students in the course.

In the learning level of the Kirkpatrick Model, the focus was on the students' achievement of the learning outcomes. Activities, the mid-term and final exams were used as assessment and evaluation tools to measure student achievement. The mid-term and final exams required students' in-person attendance to take the exams online in the college labs. This was intended to solve the identity issue of the students on the online courses. The course's overall grade indicated that most students were above average, and no student failed the course. Grades are depicted in Figure 9.

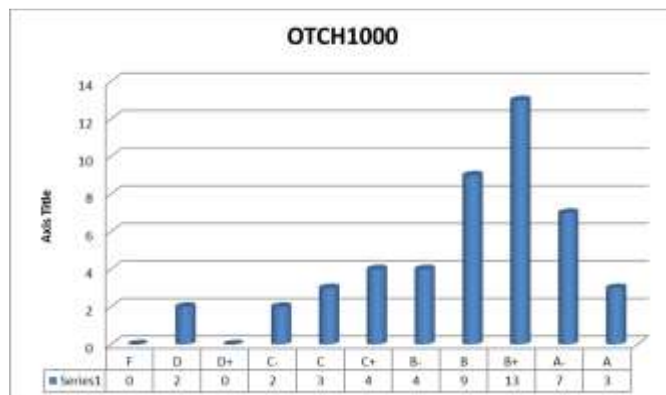


Figure 9. Students' grades in the Study Skills course (Fall 2018)

In the third and fourth levels of the Kirkpatrick Model, behavior and return on investment were not measured, as they were not part of the Design-Based Research (DBR).

IV. CONCLUSION

Due to the complexity and diversity of eLearning environments, instructional designers need to document their design processes and share their experiences so that new theoretical knowledge and applications continue to be generated. Apparently, designing authentic online courses involves a set of interrelated elements and diverse data sources. It is imperative, therefore, for instructional designers to follow a systematic and systemic design process, taking into consideration a reiterative loop of feedback from all stakeholders. The ADDIE Model, for example, has been used in this study, where all processes and procedures in each phase were documented. Additionally, valuable inputs and feedback were solicited from various concerned sources (e.g., SMEs, students, instructional designers, e-learning experts, etc.). Accordingly, two contextual factors were identified and added to the checklist of design principles. In addition, the summative evaluation of the resultant product indicates that the students had a positive online learning experience. Nonetheless, it is important to note that there are crucial issues and challenges that need to be considered in designing online courses. These include, but are not limited to: compatibility with the attributes of the learning management system; equity and equality of accessibility; authentic e-assessment, embedded professional development, and electronic performance support for both faculty and students, etc. The findings of this study demonstrate that the design-based approach appears to be an invaluable research methodology for documenting the fine details of all instructional design phases, as well as for generating new design principles that can be adapted and adopted by practitioners in other relatively similar learning environments.

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